National Mapping Program

Subactivity	1999 Estimate	Uncontrol. & Related Chgs	Program Redirect	Program Changes	FY 2000 Budget Request	Change from 1999
Mapping Data Collection and Integration	63,858	876	-7,880	1,271	58,125	-5,733
Earth Science Information Management & Delivery	36,388	759	-5,197	11,750	43,700	7,312
Geographic Research & Applications	38,069	875	-6,385	1,050	33,609	-4,460
Total Requirements $000	138,315	2,510	-19,462	14,071	135,434	-2,881

Note: The Program Redirect column reflects the redirection of funds to the Integrated Science, Science Support, and Facilities activities.

Activity Summary

Introduction

Building on 120 years of cartographic and geographic expertise as the lead Federal agency for civil mapping, the USGS ensures a nationwide geographic information knowledge base by providing map and geographic layers such as satellite and aerial imagery, elevation, hydrography, land cover (urban, rural, forested), and boundaries. Easily accessible, nationally consistent maps and images of the Earth's surface are critical to making informed decisions about complex natural resource, environmental, and hazards issues; public land management; emergency response; urban planning; and public health issues facing all segments of the Nation. To respond to national socio-economic issues that have geographic aspects, the USGS provides:

- National map and geospatial data coverage,

USGS Mapping Applications Around the Nation

USGS geospatial data are fundamental to broad, regional studies and to essential governmental activities such as PUBLIC LAND MANAGEMENT, EMERGENCY RESPONSE, URBAN PLANNING, and HEALTH ISSUES. Recent applications include:

- Up-to-the-minute mapping in Florida for wildland fire response; long-term management of wetlands.
- Updates of statewide hydrography for Kansas water quality analyses and reporting.
- On-site emergency support in Minnesota during forest fires, tornadoes, and floods; updates of digital road files; visualizations of construction projects; siting of archaeological locations.
- Building of detailed land use/land cover data for statewide New Jersey watershed management and fish and wildlife habitat applications.
- Defining a portion of the Oklahoma - Texas State border that is based on a meandering river.
- Partnering with Day County, South Dakota, FEMA, and State emergency response officials to analyze and remedy long-term flooding in northeast sections of the State.

- Leadership in developing a National Spatial Data Infrastructure,
- Expanding USGS global leadership role in acquiring, managing and using land resources observation technology and satellite data,
- Research to advance the understanding of geography, cartography, and geospatial information science,

Accurate and comprehensive information about the location and relations among natural and constructed features at or near the Earth's surface . . .

GEOSPATIAL INFORMATION

. . . is fundamental to wise economic and physical development, land-management decisions, protection of resources, and response to and mitigation of damage from natural hazards.

- Assessments, analyses, and decision-support tools,
- Long-term collection, management, archiving, and access of current and historical natural science data, and
- Development of national and international standards that enable geospatial data to be shared universally.

The USGS National Mapping Program (NMP) fulfills its responsibilities by ensuring the AVAILABILITY, long-term ACCESSIBILITY, and APPLICABILITY of accurate, up-to-date, standardized, and integrated national coverage of base geospatial information through three subactivities:

AVAILABILITY

ensured through up-to-date creation and maintenance of key national data bases.

Availability — The Mapping Data Collection and Integration (MDCI) Subactivity ensures that the Nation's needs for base geospatial data and products are met. The availability of consistent, multipurpose products on a national scale advances innovative applications for regional and community-based scientific studies and encourages a wide range of commercial enterprises. Developed in concert with the National Spatial Data Infrastructure, these data assist government managers in the administration of natural resources, in protecting citizens and property, and in providing efficient public services. In partnership with Federal, State, local, and private organizations, USGS programs reduce duplication of effort and cost for base geospatial data used in both the public and private sectors and improve the usefulness and effectiveness of the Nation's geographic information base.

ACCESSIBILITY

ensured through long-term preservation and rapid delivery of maps and natural science data and imagery.

Accessibility — The work supported by the Earth Science Information Management and Delivery (ESIMD) Subactivity is growing in response to citizens, businesses, and government agencies that are demanding greater and faster access to the burgeoning collection of natural science data generated by USGS and other agencies and partners. By using the latest

information delivery technology, the USGS provides simple and easy access to a wide variety of maps and natural science information electronically and through a national network of Earth Science Information Centers. To serve the public good as an authoritative and reliable national repository for current and historical Earth and natural science information, the USGS also maintains nationwide map and imagery archives and geospatial data bases and supports the National Geospatial Data Clearinghouse.

APPLICABILITY

ensured through state-of-the-art research to improve understanding of geographic processes, methods, and geospatial information technology.

Applicability — Research conducted under the Geographic Research and Applications (GRA) Subactivity contributes to the informed management of the Nation's natural resources and to the solution of critical societal problems. In collaboration with Federal, State, local, academic and private sector partners, this program improves the understanding and application of geospatial data – information that includes a "where" component – through investigation and application of state-of-the-art geographic and cartographic methods and associated information technology. Specific activities include developing and applying the latest geographic, cartographic, and information science to promote the production and interdisciplinary analysis of geospatial data and information.

FY 2000 Program Highlights

	($000) Program Change
Disaster Information Network	+8,000
Comm/Fed. Info Partnership	+5,250
Satellite Data Archive	+2,500
Real-Time Hazards	+450
Research & Monitoring for Amphibians	+600
High-Performance Computing and Communication	-2,000
Technological Efficiencies	- 729

The FY 2000 Budget Request for the USGS NMP includes $16.8 million in proposed program increases and $2.729 million in proposed program decreases. The proposed increases are in the MDCI Subactivity ($4 million for the Community/Federal Information Partnership), the ESIMD Subactivity ($8 million for the Disaster Information Network; $2.5 million for Satellite Data Archive; $1.25 million for C/FIP) and the GRA Subactivity ($0.6 million for Amphibians, $0.45 million for Real-Time Hazards). The proposed decreases are in the MDCI Subactivity ($0.729 million reduction to be achieved by technological efficiencies; $2 million reduction for high-performance computing and communications).

Disaster Information Network (DIN) (+$8.0 million) — Disasters strike across political, organizational, sociological, and other geographic boundaries. Losses in this country alone from 1992-96 averaged more than $50 billion per year and likely will continue to rise as infrastructure and population growth increases in urban areas at risk. Concurrently, due to the exponential increase in the number of computers connected to the Internet as well as improved digital transfer rates and data sources, primarily in the last few years, a disaster information network is particularly necessary, feasible, and timely. The goal of the network is to establish a fast, reliable communications link among existing sources of disaster information and those who need it — disaster mitigation managers and citizens affected by natural disasters. A National Research Council review of the DIN program, *Reducing Disaster Losses*

through Better Information, published in 1999 strongly endorses the advancement of the concept for an improved information system to save lives and reduce losses related to natural disasters.

The USGS Hazards mission goal is to "provide science for a changing world in response to present and anticipated needs, focusing efforts to predict and monitor hazardous events in near-real and real time and too conduct risk assessments to mitigate loss." Our critical role in providing disaster related information for specific hazards, such as earthquakes, volcanoes, landslides, and floods; our expertise and lead responsibility for geospatial information services among Federal, State, and local agencies and the private sector; and our multidisciplinary expertise and strength in integration of scientific data for problem solving underlie USGS leadership role in support of this multiagency effort.

This budget request includes an increase of $8 million to the USGS Earth Science Information Management and Delivery subactivity to enhance coordination among Federal agencies and public and private organizations, to improve organization of and access to disaster information, to increase the reliability of Federal intranets and other communication channels, and to standardize data sets, access methods, and analysis tools. Federal coordination will be managed through a multiagency integrated program office, comprising representatives from appropriate Federal agencies and hosted by the USGS. The program office will develop policy and work to integrate information and establish the national disaster information network.

Community/Federal Information Partnership (C/FIP) (+$5.25 million) — As a participant in the interagency C/FIP, the NMP increases the leveraging of Federal investments with other Federal, State, and local organizations and the private sector to collaboratively develop and maintain consistent national geospatial data such as orthoimagery, elevation, and hydrography information. These core data categories provide the fundamental information required by Federal programs as well as complementary programs at the State and local levels ($4.0 million, for cooperative agreements, MDCI Subactivity). In addition, the NMP will provide improved Internet-based access to its vast collection of national geospatial data and natural science information, provide metadata (data about data) development for this information, and participate in linking this information to the clearinghouse ($1.25 million, ESIMD Subactivity). The total USGS effort of $10.0 million is discussed in the General Statement.

Satellite Data Archive (+$2.5 million) — USGS manages the Nation's only permanent comprehensive historical and up-to-the-minute repository of global remotely sensed data, which is housed in the National Satellite Land Remote Sensing Data Archive (NSLRSDA). The increase will support the long-term preservation of existing satellite data that dates back to 1959 and that is valued at $2 to 3 billion. This increase enables the acquisition of and access to massive future additions to the archive from planned government and private satellite missions.

Real-Time Hazards (CINDI; +$0.45 million) — The concept of the USGS research facility called the Center for Integration of Natural Disaster Information (CINDI) was put to the test immediately after the Hurricane Mitch disaster in Honduras in the fall of 1998. Through the CINDI, the USGS responded to the data integration and geographic information systems needs of government response agencies and organizations, including USAID, the U.S. Army Corps of Engineers, the Office of the Vice-President of the United States, the Canadian CARE

organization, the World Bank, the State Department's Map Procurement Division, and the Center for Disease Control. The proposed increase will fund the integration of hazards-related data from USGS hazards activities and information in near real-time, the development of a working store of information that will be available on short notice for use in natural hazards response, and construction of predictive system models for mitigation of future loss of life and property. These enhanced capabilities and data bases will assist Federal and State managers in rapidly understanding the risks posed by natural hazards to people and public infrastructure, which in turn facilitates response to disasters.

Research and Monitoring for Amphibians as an Indicator Species (+$0.6 million) — National Mapping Program support of this bureau effort will include data and spatial analysis for site-specific monitoring, for characterization of available amphibian habitat, contaminant distribution, past and present land-cover / land-use, changes in canopy cover, drought-induced changes, and for risk prediction. This increase is part of a multidisciplinary effort with the Water Resources Investigations and Biological Research activities totaling $5.6 million.

High-Performance Computing and Communication (-$2.0 million) — The USGS pilot for delivering natural science data to a consortium of academic institutions in Ohio has been successful in achieving the goal of establishing near-real-time delivery of natural science data to State, local, and private consortia concerned with environmental monitoring, climate change research, natural resource management, and disaster and economic analyses. At a funding level of $1.0 million in FY 2000, USGS will be able to carry out the operation and maintenance of this project.

Technological Efficiencies (-$0.729 million) — The USGS will reduce funding for Mapping Data Collection and Integration as a result of anticipated savings in technological and process improvements through the application of new hardware, software, and procedures.

Federal Role and Key Trends

National Mapping Program activities of note for the next decade are to:

- Lead efforts to ensure a National Spatial Data Infrastructure and increasing the involvement of the private sector, States, and communities in building and distributing geographic data,

- Provide techniques for the rapid and effective integration and application of geospatial, natural science, and socio-economic data such as (1) classified data for use by civil agencies as appropriate to achieve their missions and (2) natural hazards information for use by disaster and emergency response agencies and public officials,

From Map Making. . .

The role of the USGS National Mapping Program has evolved from producing paper maps to that of integrating and coordinating the geographic information produced by Federal, State, local, and private-sector entities. This evolution enables the USGS to provide compatible base geospatial data nationwide.

. . . to Coordinating & Integrating

- Provide continuing leadership for the U.S. land resource observation program of natural science data acquisition, preservation, and application,

- Build on technological advances in collecting, managing, archiving, and distributing satellite and imagery data,

- Improve the seamless integration of geospatial data, such as the National Elevation Dataset,

- Apply relevant computer and telecommunications technology to broader use of geographic information systems, three-dimensional visualizations of land forms, and expert systems to interpret aerial photography and satellite imagery,

- Continue advances in quick delivery of geospatial products to all customers and improve customer interaction, dialogue, and satisfaction at all levels,

- Develop innovative long-term strategies for maintaining natural resources data archives,

- Develop standards to ensure compliance with national, international, and open GIS specifications.

USGS Product Standards Available On Line

An updated web site describing the standards used by the USGS to produce and maintain geospatial data products is now available:

http://mapping.usgs.gov/standards

These standards provide criteria and specifications to ensure that all products reflect current mapping and data policies and are accurate and consistent in style and content. To obtain related documents, call the USGS toll free: 1-888-ASK-USGS.

National Spatial Data Infrastructure — A major focus of USGS mapping activities for the next decade is to champion the building of a National Spatial Data Infrastructure (NSDI) that enables governments, industry, the public, and academia to cooperatively produce and share geospatial data. The NSDI encompasses the technology, policies, standards, and human resources necessary to acquire, process, store, distribute, and improve utilization of geospatial data nationwide. A robust NSDI will make accurate and timely geospatial data more readily available for solving community and national problems and support applications in such areas as transportation, community development, agriculture, emergency response, and environmental management, and at a reasonable cost with minimum duplication of effort. Key roles for the USGS in the NSDI are to –

- Ensure national standards for sharing and documenting base geospatial data,

- Assist in defining and implementing a geospatial data framework,

- Promote and participate in cooperative ventures and data sharing arrangements for geospatial data, and

- Participate in the National Geospatial Data Clearinghouse, which is a distributed network of geospatial data producers, managers, and users linked electronically. (The clearinghouse

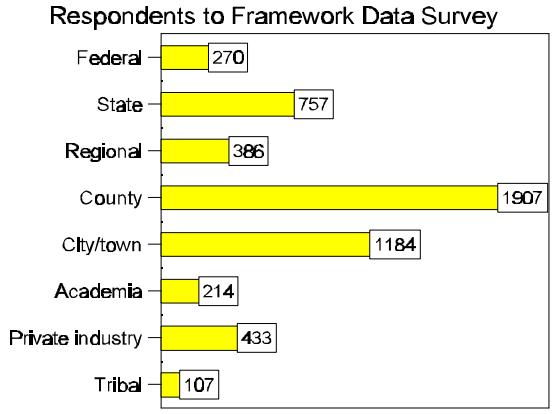
serves as a catalog for querying and assessing participants' data offerings, and includes Internet links enabling browsers to either download or purchase geospatial data sets.)

Federal Geographic Data Committee — The Federal Geographic Data Committee (FGDC), established by OMB Circular A-16 and chaired by the Secretary of the Interior**,** comprises 16 Federal agencies that produce and use geographic data. The USGS provides executive staff support to the FGDC, which coordinates the Federal government's development and implementation of the NSDI through partnership programs with State, local, and tribal governments, private industry, academia, and professional societies. The FGDC has formal recognition agreements with 29 State geographic information councils and coordinates NSDI activities with organizations such as the National States Geographic Information Council, National Association of Counties, National League of Cities, University Consortium for Geographic Information Science, and Open GIS Consortium. Major NSDI initiatives coordinated by the FGDC under Executive Order 12906 include –

- Creation of the Internet-based National Geospatial Data Clearinghouse**,**
- Development of standards for data documentation, collection, and exchange, and
- Creation of a national digital geospatial data framework of basic categories of data significant to a broad variety of users.

Resulting from one of the largest digital surveys ever conducted, the USGS has researched the location and extent of the National Spatial Data Infrastructure data-building activities of more than 5000 government agencies, academic institutions, and private sector firms. Respondents reported current activity in one or more data themes including transportation, hydrography, elevation, digital imagery, government boundaries, geodetic control, and cadastral (property boundaries/ownership). Activity is defined as collecting, coordinating, updating, integrating, distributing, or creating metadata (that is, data about data) for at least one theme.

Results from the survey, conducted in 1998 by the National States Geographic Information Council and the Federal Geographic Data Committee, provide a baseline inventory of geospatial data building activity within each State. The survey also gathered information about data resolution, staffing and funding levels, software systems, metadata standards, and data sharing and coordination activities. All of these data are provided to the State survey coordinators to empower State and local government users to keep track of their own data at their own level. In turn, these data feed into a national database, and through this process a major piece of the NSDI will be constructed.



National Civil Applications of Classified Data – The USGS has had the lead Federal government responsibility for the civil application of classified data since the 1960's. In 1968,

the USGS pioneered the application of classified overhead imagery in the preparation and revision of the Nation's topographic maps. Since 1975, on behalf of the DOI, the USGS has chaired the Civil Applications Committee (CAC), chartered by the Office of the President, to coordinate and assist civil Federal use of classified collections. During the last decade these applications have expanded beyond traditional mapping to a broad range of environmental and remote sensing uses central to civil Federal agency missions. Examples include monitoring volcanoes; early detection of forest fires; emergency response to natural disasters, such as landslides, earthquakes, droughts, and floods; monitoring ecosystems; and wetlands mapping. To accommodate the increased use of classified data for civil applications the USGS has expanded five facilities, enlarged archives, and developed more capable information distribution systems. These classified data activities in the NMP are managed through the National Civil Applications Program (NCAP), a cross-cutting activity with components in the three NMP subactivities. The NCAP also supports other USGS and Federal civil programs related to the use of classified data such as early detection of wildland fires and mapping of active fires. The program focuses on enhancing capabilities to permit near real-time use of classified data in protecting the Nation's health, safety, and environment, to manage Federal lands and resources, and to support economic growth and development.

Customers and Partnerships

Customers – The USGS coordinates mapping activities with stakeholders from Federal agencies, State and local government, academia, and private industry. Forums such as interagency steering committees, technical working groups, State mapping and geographic information councils, cooperator and business partner workshops, and conferences sponsored by professional societies and educational organizations provide up-to-date assessments of program performance that are used in decisions to improve products, program management, and strategic direction.

The USGS informs individual citizens of the value of maps, geospatial data, and earth science information products by conducting outreach and customer research activities.

Public outreach activities include –

- Providing lectures and educational materials to school groups, youth and civic organizations,
- Conducting facility tours and sponsoring open house events for the public,
- Demonstrating the use of USGS products at fairs, trade shows, and conventions, and
- Providing land resource observation advanced remote sensing products to international and national customers for various resource management, environment, hazards, and global climate research applications.

Customer research activities include –

- Developing World Wide Web tools to encourage customer feedback on USGS products and services,

- Analyzing map user information from surveys performed both in-house and in cooperation with the International Map Trade Association,

- Working with private industry to evaluate public interest in new map products and technologies, and

- Receiving input from retailers of USGS products and data (see Business Partners below) on the use of USGS products purchased.

Customer feedback is obtained from –

- Stakeholder workshops and conferences to identify changing user needs, proposed new products and services, and impacts of new technologies on data access and applications,

- Over-the-counter and call-in customers at USGS Earth Science Information Centers to evaluate customer service satisfaction,

- The general public to assess preferred products and formats for the electronic National Atlas of the United States,

- NASA, other government agencies, the commercial sector, and other customers to develop and evaluate satellite products for land resource observations, and

- Comment cards returned by purchasers of USGS maps and reports to improve ordering and distribution procedures.

From Retailer . . .

As part of a broader USGS effort to further commercialize product distribution, the NMP has expanded its Business Partner Program beyond the traditional network of topographic and thematic map dealers to include retailers of aerial photographs, satellite images, and digital cartographic data. The network encompasses more than 2,500 agreements, most with the private sector. The USGS routinely refers customers to local Business Partners, including direct links from USGS to Business Partner web sites.

. . . to Wholesaler

Customer outreach and research activities increase the public's awareness of USGS products and services available to them, assist in monitoring trends in map product usage and purchase, and proactively solicit customer feedback regarding the quality and applicability of USGS products and services, which is then incorporated in technical, programmatic, and strategic decision making.

Partnerships – Sharing the responsibility for data collection, maintenance, and distribution reduces the cost and increases the quantity of mapping information for all participants. This approach serves the strategic goals of long-term collaboration and data integration with partner organizations to build and maintain the National Spatial Data Infrastructure. The USGS is bringing coordination services directly to partner agencies by collocating liaison offices at regional, State, and local levels. Other USGS mapping program partnership activities and benefits include:

- Business Partners – To move from a retail to a wholesale environment, the USGS enlists the private sector to distribute products.

- Innovative Partnerships – To ensure geospatial data availability and to support NSDI, competitively awarded funding is provided to non-Federal partners for the cooperative production of digital data.

- Cooperative Research and Development Agreements – To support technology transfer, the USGS National Mapping Program has agreements with the private sector in areas related to the cartographic, geographic, and information sciences. The Federal Technology Transfer Act of 1986 made technology transfer the responsibility of all Federal scientists and engineers and gave Federal agencies the authority to enter into CRADA's with the commercial sector.

Consumer and Partner Benefits of Cooperative Research Agreements

Partner	Benefit – The creation of:
Microsoft Corporation	A general-public web site and server, "The TerraServer," for displaying and browsing selected USGS digital maps
Now What Software	Earth science CD-ROM data products developed for commercial markets
LizardTech, Incorporated	Combined LizardTech technology and USGS imagery delivered on consumer-level CD-ROM's
Sprint Corporation	Advanced high-speed networks for remote access, image processing, and delivery of large data sets

- NSDI Framework Partnerships – With the purpose of building the National Spatial Data Infrastructure, this USGS program pursues partnerships with non-Federal organizations. These partnerships serve to organize and enhance the activities of the geospatial data community to provide common spatial data themes, such as elevation, transportation, hydrography, bathymetry, property boundaries, and digital imagery.

- NSDI Cooperative Agreements Program – To advance the development, coordination, awareness, and understanding of the National Spatial Data Infrastructure, the USGS cooperative agreements program develops clearinghouses and standards for geospatial data, implements educational programs, and builds or strengthen relationships among organizations.

Government Performance and Results Act

Performance Targets — The following table represents the performance elements contributed by this budget activity to the two GPRA Program Activities provided in aggregate in Exhibit A of the Performance Plan. Linkages of budget and performance are further discussed in the FY 2000 Annual Performance Plan.

GPRA Program Activity	**Hazards**				
Goal Code	01.01.01. 01.00	01.01.01. 02.00	01.01.01. 03.00	01.01.01. 04.00	01.01.01. 05.00
Performance Measure	Monitoring Networks maintained	Risk Assess-ments delivered	Real-time Streamgages (cumulative) (rate 100/yr)	Real-time Earthquake Sensors (cumulative) (rate 20/yr)	Stake-holder Meetings
Bureau FY 98 Baseline	6	16	4,571	100	16
Bureau FY 99 Annual Target	6	14	4,671	120	16
National Mapping Program	1	0	0	0	2
Bureau FY 00 Annual Target	6	12	4,921	200	27
National Mapping Program	1	0	0	0	14

GPRA Program Activity	**Environment & Natural Resources**				
Goal Code	02.01.01. 01.00	02.01.01. 02.00	02.01.01. 03.00	02.01.01. 04.00	02.01.01. 05.00
Performance Measure	Long-term data collection & mngmnt efforts maintained & improved & large data infrastructures supported	New system-atic analyses & investiga-tions delivered	Decision support systems or predictive models developed or improved & delivered to customers	University-based partner-ships for natural systems analysis	Stake-holder Meetings
Bureau FY 98 Baseline	40	865	5	270	212
Bureau FY 99 Annual Target	40	843	6	272	228
National Mapping Program	9	0	1	0	36
Bureau FY 00 Annual Target	36	875	7	272	241
National Mapping Program	9	0	1	0	40